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Model of Enhanced Aarogya Setu App to Make it A Permanent Health App for Indian Citizens

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Abstract - In the late 2019, a novel Coronavirus Disease 2019 was first identified in Wuhan city of Hubei Province, China. On February 11, 2020, the World Health Organization (WHO) announced the official designation for this current CoV-associated disease to be "Covid-19", caused by the SARS-CoV-2. People around the world started panicking due to highly infectious nature of the virus. Almost all countries of the world started making efforts for the containment of this pandemic. Among various steps, one was the development of mobile applications. In India, National Informatics Centre, under the Ministry of Electronics and Information Technology, Government of India, developed Aarogya Setu app to stop the spread of Covid-19. A lot of resources and infrastructural cost was invested in development and advertisement of this app. About 17 crore users have downloaded it and have become familiar with its interface, Once the pandemic situation is over, the users who have downloaded this app will uninstall it. Thus, all the costs and efforts spent on development and downloading it will go underutilized.

This paper presents a model of an enhanced version of Aarogya Setu app with additional features which can be more purposefully utilized during Covid- 19 and also when the pandemic situation is over and making it a permanent health app for Indian Citizens. Description of existing Aarogya Setu app as well as newly added features of proposed enhanced Aarogya Setu app has been given in detail in this paper.

Keywords- Aarogya Setu, Covid-19, Corona Vaccination, Health and Fitness Apps, Heart Point .

I. INTRODUCTION

At present, a novel Coronavirus Disease 2019 (COVID-19) has affected the people worldwide. The primary cluster of patients was found to be connected with the Huanan South China Seafood Market in Wuhan. This severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has emerged in late 2019, which has posed a global health threat with its ongoing pandemic in many countries and territories.

CoVs belong to the family Coronaviridae (subfamily Coronavirinae), the members of which infect a broad range of hosts, producing symptoms and diseases ranging from a common cold to severe and ultimately fatal illnesses such as SARS, MERS, and, as of present, Covid-19. The SARS-CoV-2 (formerly 2019-nCoV) is considered as one of the seven members of the CoV family that infect humans, and it belongs to the same lineage of CoVs that causes SARS; however, this novel virus is genetically distinct. Until 2020, six CoVs were known to infect humans include HCoV-229E, HCoV-NL63, HCoV-OC43, HCoV-HKU1, SARS-CoV, and MERS-CoV. Though SARS-CoV and MERS-CoV have resulted in outbreaks with high mortality, others remain associated with mild upper- respiratory tract illnesses.

Newly evolved CoVs are thus posing a significant threat to global public health. Over the past two decades, the current emergence of Covid-19 is the third CoV outbreak in human. It is no coincidence that Fan et al. predicted potential SARS- or MERS-like CoV outbreaks in China following pathogen transmission from bats [1]. The COVID-19 that emerged in China spread rapidly throughout the country and subsequently to other countries.

Due to the severity of this outbreak and the potential of spreading on an international scale, the WHO declared a "global health emergency" on January 31, 2020. Subsequently, on March 11, 2020, a pandemic situation was declared [2]. For containment of Covid-19 Government of India along with state governments took many steps out of which one was to develop a mobile application. Many state governments and municipal corporations designed various mobile applications for the different purpose to tackle the

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pandemic. Aarogya Setu app, developed by National Informatics Centre, Ministry of Electronics and IT is most downloaded and used which focuses on contact tracing, geo tagging, media, statistics and to generate e-passes.

II. AAROGYA SETU

Aarogya Setu is an open-source mobile application developed by the National Informatics Centre of Government of India under the Ministry of Electronics and Information Technology. This app is aimed at augmenting the initiative of Government of India, particularly Department of Health in proactive reaching out to and informing the users of the app regarding risks, best practices and relevant advisories pertaining to the containment of Covid–19 [3]. The app reached more than 100 million installs in first 40 days. On May 26, amid growing privacy and security concerns, the source code of the app was made public [4].

How Does Aarogya Setu Works

Aarogya Setu uses contact tracing to record details of all the people the user may have come in contact with, as the user go about his/her normal activities. If any one of them, at a later point in time, tests positive for COVID-19, the user is immediately informed and proactive medical intervention is arranged for him/her.

The app considers Bluetooth range as a proximity sensor under which the user can be infected by another Covid-19 positive patient. When two users with the app installed in their smartphones come in each other's Bluetooth range the app will exchange information available in the Aarogya Setu app. If one of the users found positive, the other user will be notified about possibility of being infected. These potential cases are then forwarded to government for further testing [5].

Technical Specifications of Aarogya Setu

The source code of Aarogya Setu was made public by the government after the privacy violation blames by opposition leaders. The source code is available at GitHub which has 286 issues, 149 pull requests and 129 commits till date. The Aarogya Setu App is developed using two computer languages Java and Kotlin with .java and .kt file extensions respectively. 53.4 % of the source code of the app is written in Java and 46.6% is written in Kotlin [6].

Features of Aarogya Setu App

Following are some important features of Aarogya Setu App

Contact Tracing

Contact tracing is a tool that can be used to slow the spread of infectious disease. Covid-19 is one of the most infectious disease where identification of individuals who may have come into contact with an infected person is very important.

Geo Tagging

Geo-tagging is the process of attaching location information in the form of geographical metadata to digital media. The information in geo-tag may include place co-ordinates (latitude and longitude), distances etc. Geo-tags may also be applied to digital output on social media. In Aarogya Setu App Geo-tagging is used to compare and tag details of two or more users in a particular geographical location.

Self-Assessment

The Aarogya Setu App ask users to self asses them in order to check their status with respect to Covid-19.

Limitations of Aarogya Setu App

The features of Aarogya Setu have been discussed above but still this app has limitations which are as follows.

Designed for Single Purpose

The Aarogya Setu App has been dedicatedly designed and developed for the containment of Covid-19 coronavirus. Government of India has appealed citizen to download this app and also made necessary to have this app in their mobile phones while moving in public and travelling. A lot of efforts and infrastructure has already been invested in development and advertisement of the app which reflects in the number of downloads which is currently 16.87 crores. Now the question arises that what will be the use of this app once the pandemic situation is over. The users who have downloaded this app will uninstall the app or it can be utilized for any other purpose.

Lack of Information related to Health Tips

As per the statistics, in India the number of patients increased exponentially for which the literacy rate, huge population and “nothing will happen” attitude of the majority of people is responsible. It is also found that the eating and food habits of Indian citizen which includes variety of spices and fresh food products helped us in fighting and increasing our immunity system against the virus. Now the point is that, this app could have a list of tips and guidelines about the foods and drinks which are helpful in boosting the immunity.

III. HEALTH AND FITNESS APPS

An individual health means state of being well and free from illness. However as per the constitution of the World Health Organisation “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”

Achieving and maintaining a healthy life becoming difficult for the individuals for many reasons which includes lack of availability of foods, lack of genuine nutrients in the available food and most important is the lack of balanced life style. To maintain the healthy state, one must stay fit. Because a person cannot be healthy forever, he/she must be

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fit to increase the time span of healthy state. With the advent of technology many things changed and the same applies on Health and Fitness. Now we have n number of applications to guide us, in general or in a customized way to stay healthy and fit. Few of the applications are given below.

i. Google Fit

Google Fit approaches things differently from other fitness apps. You can still check up on common metrics like your heart rate and step count, but Google Fit combines your activity metrics to make them mean something. For instance, you might see that your lunch walk took around 22 minutes to complete, but what does that mean for your overall health? How does it affect you? And what goals do you need to meet to stay healthy?

Google worked with the American Heart Association to create two goals based on the Heart Association's activity recommendations. The results are Move Minutes and Heart Points [7].

- **Move Minutes:** Move Minutes is another way to say "active time." You earn Move Minutes for every bit of physical activity you do, including walks, runs, swims, and yoga.
- **Heart Points:** Heart Points are earned when you perform activities at a higher pace. You earn one Heart Point per minute of moderately intense exercise, like from a swift walk. You also earn double Heart Points if you're taking part in more intense activities like a long run.

ii. MyFitnessPal

MyFitnessPal is one of the most popular web-based exercise and fitness social media applications available. MyFitnessPal (MFP) helps you keep track of your daily food and beverage intake, calculating all your nutrients, calories, and vitamins for you. This enables you to analyze patterns and find out what your diet is missing or where you need to cut back a little.

MyFitnessPal is loaded with great recipes, workouts, and tons of health and wellness tips. MyFitnessPal also connects with many of the popular activity tracking devices and mobile apps such as the Fitbit, the Lumo Lift, and the Polar Loop. These devices can track your steps, calories burned, active time, and more [8].

iii. Samsung Health

Samsung Health provides core features to keep up your body fit and healthy. It will record and analyse your daily activities and habits to help maintain successful diet and lead healthy lifestyle.

Whether you walk or run, hike or bike, play indoor or outdoor sports, you can add and track the various physical exercises and activities in a single step using the various built-in trackers. Samsung Health helps to create a balanced lifestyle pattern by recording a variety of information like your food, caffeine and water intake details. Provide your daily snacks, food, water and caffeine intake and track your diet and weight on the go while staying comfortable using the sleep & stress tracker [9].

IV. PROPOSED MODEL OF ENHANCED AAROGYA SETU

In development of the Aarogya Setu App, a lot of efforts and infrastructure is invested. Since the app is designed especially for containment of Covid-19 coronavirus pandemic. As soon as the pandemic will get weaker and over, the Aarogya Setu App will become useless and the efforts and infrastructure invested in developing of the app will go in vain.

To prevent the wastage and underutilization of the Aarogya Setu App, the model of Enhanced Aarogya Setu App is presented in this work. The proposed model is the combination of the best features of Aarogya Setu, Google Fit and MyFitnessPal apps. The proposed model of the Enhanced Aarogya Setu App focuses on making this app as a permanent health app for Indian citizen.

Figure 1 presents the proposed model of Enhanced Aarogya Setu App which includes existing features and added features. Existing Features includes Self-Assessment, Contact Tracing and Geo-Tagging. Added Features are Vaccination and Health and Fitness.

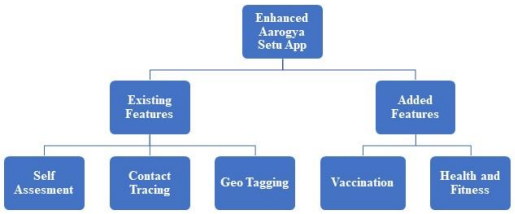

Figure 1: Proposed Model of Enhanced Aarogya Setu App

Various tabs used in the Proposed Model:

Figure 2: Various Tabs of the Proposed Model

Figure 2 displays the menus of the proposed model of Aarogya Setu App. Originally the Aarogya Setu App's Home screen displays four menus which are Your Status, Media, Covid Updates and e-Pass respectively. Two new icons are added; one for Vaccination and another for Your Fitness.

The expansion of Vaccination tab shall look like following.

Figure 3: Expansion of Vaccination Tab

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Figure 3 represents the expansion of "Vaccination" Menu of the proposed model. This menu will have "My Certificate" button, using which the vaccination status of the user can be checked and if vaccinated then the user can use this to show his Vaccination Certificate while travelling or in public, if required.

The expansion of "Your Fitness" Tab should look like following:

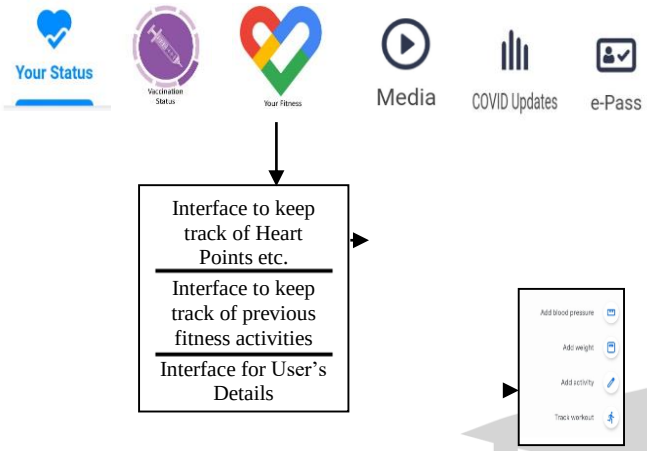

Figure 4: Expansion of Your Fitness Tab

Figure 4 represents the expanded screen of "Your Fitness" menu. This Home screen displays the status of your daily goals which includes number of steps moved, calories burnt and heart points earned. This also shows the status of your weekly target. The plus '+' sign available at bottom right corner of the screen provides additional options which are as follows -

- Add blood pressure
- Add weight
- Add activity
- Track Workout
  - This allows you to track your additional activities or participation in sports other than walking such as Running, Swimming, Cycling, Aerobics, Dancing etc.

Following figure is the expansion of "Journal" Screen of Your Fitness Tab

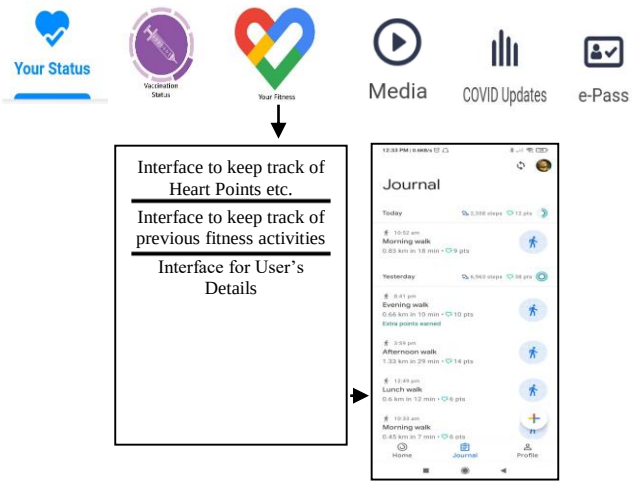

Figure 5: Sample Journal Screen of Fitness Tab

Figure 5 shows the interface for the previous health activities. This keeps the record of your previous activities with timing and location as well.

Profile screen under the "Your Fitness" tab should look like following screen.

Figure 6: Sample Screen of Profile Sub Menu under Your Fitness Tab

Figure 6 is the screen shot of "Profile" tab of Google Fit. This tab allows the user to set his/her daily goals and also stores the basic information such as Gender, Birthday, Weight and Height.

Features of Proposed Model of Enhanced Aarogya Setu App

The features of proposed model of Enhanced Aarogya Setu App can be broadly divided into two categories:

1. Vaccination
2. Health and Fitness

Vaccination

The proposed model of Enhanced Aarogya Setu App has following features under the Vaccination.

i) To keep records of vaccination.
ii) To issue certificate of vaccination to citizen.

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iii) To validate the vaccination status of the citizen.

i) To keep records of vaccination

The Aarogya Setu App is downloaded by more than 16 crores users. As the vaccine is now available, Aarogya Setu can be used very effectively to count and keep the records of number of citizens got vaccinated and rest.

ii) To issue vaccination certificate

The Aarogya Setu App can be used as a tool for issuing certificates to the users whose vaccination is done. The idea of certificate issuance is taken from another digital document app of Government of India, DigiLocker.

iii) To validate the vaccination status of user

Once the users are done with the vaccination, they can use the issued certificate to show it to the administrative authorities of various departments in different situations such as while travelling etc. when asked. This can be achieved by providing QR Codes on the vaccination certificates.

Health and Fitness

The proposed model of Enhanced Aarogya Setu App has following features for Health and Fitness.

i) To prescribe health tips to individuals
ii) To allow the user to perform diet watching
iii) To keep track of Heart Point earned, number of steps covered and calories burnt
iv) To keep track of previous fitness activities

i) To prescribe health tips to individuals

The Enhanced Aarogya Setu App can also be used for prescribing health tips to the individual users based on their health conditions. This will be done after taking some basic input from the user such as gender, age, weight and height. Other features that can be added in this is to provide some basic Yoga Aasans, Physical Exercise and preferred food items.

ii) To allow the user to perform diet watching

As an individual many of us at some point in our life are interested in loosing or gaining some weight and to achieve this, we start taking special diets. The suggestion is to perform diet watching first. Using a scheduled diet watching log or diary one can easily calculate the calories intake in their food and can further compare with their required calorie intake per diet in a day.

iii) To keep track of Heart Points earned, number of steps covered and calories burnt.

Activities that get your heart pumping harder have tremendous health benefits for your heart and mind. You'll earn one Heart Point for each minute of moderately intense activity, such as picking up the pace when walking your dog, and double points for more intense activities such as running. It takes just 30-minutes of brisk walking five days a week to reach WHO's recommended amount of physical activity shown to reduce the risk of heart disease, improve sleep and increase overall mental well-being.

iv) To keep track of previous fitness activities

In the proposed model of Enhanced Aarogya Setu App the user can have a kind of automatic log book of his/her previous fitness activity. This shall display the journal of previous fitness activities of the user. This displays the day wise activities performed and heart points earned through those activities. This also keeps record of the time, distance and duration of the activities and also mentions the location in Google map.

V. CONCLUSION

In order to present the Enhanced Model of Aarogya Setu App, first the detailed study of the various aspects of Aarogya Setu App was carried out, which includes the study of various technical specifications and the source code of the Aarogya Setu App taken from GitHub.

Existing Aarogya Setu App has mainly three features namely – Contact tracing, Geo tagging and Self-assessment. In the proposed model of Enhanced Aarogya Setu App, more useful additional features were added that can be used during Covid-19 and post Covid-19. Major additional features that can be used during pandemic situation are i) to provide certificates to the citizens who have been vaccinated, ii) to provide a user-friendly interface on the app to validate vaccination certificate by way of QR code generated on the screen of the user's mobile that can be used during travel within country or abroad, iii) to keep record of vaccination statistics for use by the governments. Additional features after the pandemic situation are related to health and fitness of the users. These features include- i) awareness about body mass index, food habits / diet watching, user specific exercises and yoga practices, which will help the user to keep track of his/her eating habits and plan accordingly. ii) to keep track of Heart Point earned, number of steps covered, calories burnt, previous fitness activities etc. so that the user can check and map his/her physical activities in order to maintain healthy body and mind.

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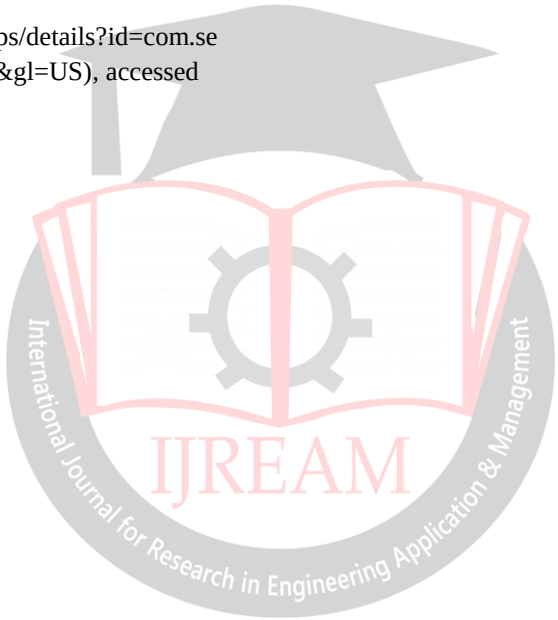

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